The trade-off between foreign direct investments and exports: The role of multiple dimensions of distance

Lankhuizen, M.B.M.; de Groot, H.L.F.; Linders, G.J.M.

2009

document version
Early version, also known as pre-print

TI 2009-050/3
Tinbergen Institute Discussion Paper

The Trade-Off between Foreign Direct Investments and Exports: The Role of Multiple Dimensions of Distance

Maureen Lankhuizen
Henri L.F. de Groot
Gert-Jan M. Linders

Dept. of Spatial Economics, VU University Amsterdam.

Tinbergen Institute

The Tinbergen Institute is the institute for economic research of the Erasmus Universiteit Rotterdam, Universiteit van Amsterdam, and Vrije Universiteit Amsterdam.

Tinbergen Institute Amsterdam
Roetersstraat 31
1018 WB Amsterdam
The Netherlands
Tel.: +31(0)20 551 3500
Fax: +31(0)20 551 3555

Tinbergen Institute Rotterdam
Burg. Oudlaan 50
3062 PA Rotterdam
The Netherlands
Tel.: +31(0)10 408 8900
Fax: +31(0)10 408 9031

The Trade-Off between Foreign Direct Investments and Exports:

The role of multiple dimensions of distance

Maureen Lankhuizen, Henri L.F. de Groot[1] and Gert-Jan M. Linders

Department of Spatial Economics, VU University Amsterdam

De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands

Abstract

To serve foreign markets, firms can either export or set up a local subsidiary through horizontal Foreign Direct Investment (FDI). The conventional proximity-concentration theory suggests that FDI substitutes for trade if distance between countries is large, while exports become more important if scale economies in production are large. This paper investigates empirically the effect of different dimensions of distance on the choice between exports and FDI. We find that different dimensions of distance affect exports and FDI differently. There is clear evidence of a proximity-concentration trade-off in geographical terms: the share of FDI sales in total foreign sales (exports and FDI sales) increases with geographical distance. The positive relation between import tariffs and FDI intensity provides further evidence for a trade-off resulting from trade costs. On the other hand, the share of FDI decreases with language differences and cultural and institutional barriers. The latter dimensions of distance thus affect FDI more strongly than exports.

JEL code: F14, F21, F23

Keywords: cultural distance, institutions, FDI and trade, spatial interaction models

[1] Corresponding author: Henri L.F. de Groot, Dept. of Spatial Economics, VU University Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, Tel: +31 20 598 6090, Fax: +31 20 598 6004, Email: hgroot@feweb.vu.nl. Useful comments by Eelke de Jong, Arjan Lejour, participants at the ERSA 2008 congress in Liverpool, and by participants at a Eureka lunch seminar at VU University Amsterdam are gratefully acknowledged. The usual disclaimer applies.

1. Introduction

To serve foreign markets, firms can either export or set up a local subsidiary through horizontal FDI. Brainard (1997) models this decision of firms as a trade-off between achieving proximity to local markets (circumventing transport costs), and concentrating production in space so as to exploit economies of scale. This is referred to as the proximity-concentration trade-off. Subsequent empirical analyses in Brainard (1997) and Helpman et al. (2004) confirm that local sales associated with FDI increase relative to exports the higher are transport costs and other trade barriers, and the lower are investment barriers and scale economies at the plant level relative to the corporate level.

In the models in Brainard (1997) and Helpman et al. (2004) distance is measured first and foremost in terms of transport costs and trade barriers. The proximity-concentration model is in essence a model of international trade. It builds on the notion that international trade decreases with 'distance' as predicted by the gravity model. When distance increases, firms will rely relatively more on FDI to access foreign markets. Scale economies are added as determinants of FDI. The models pay relatively little attention to the fact that FDI may incur costs related to distance of its own.[2] Interesting in this context is a thought-provoking contribution by Obstfeld and Rogoff (2000) focuing on apparent puzzles in international trade. They underline the importance of intangible barriers, such as incomplete information barriers, cultural barriers and institutional barriers, in explaining the persistence of 'transactional distance' between countries. Recently, the trade literature has explicitly considered the role of intangible trade barriers in explaining patterns of bilateral trade (e.g., Anderson and Marcouiller, 2002, Loungani et al., 2002, Anderson and Van Wincoop, 2004, De Groot et al., 2004). Unlike the mechanisms described by the proximity-concentration trade-off, these intangible barriers can affect the costs related to trade as well as FDI.

This paper aims to contribute to the discussion on the trade-off between exports and FDI by empirically investigating how distance affects the volume of bilateral sales and its composition in terms of trade and FDI. We consider different dimensions of distance suggested by the literature. Are markets served by exports rather than FDI sales or vice versa? Does the choice for a particular mode of entering foreign markets depend on the specific dimension of distance that is considered? To answer these questions, we estimate gravity equations for bilateral foreign sales (sum of exports and sales related to FDI) and for

[2] Brainard does include a language dummy to control for cultural familiarity and a dummy indicating whether a country has had a political coup in the last decade to proxy political risk. The share of sales associated with FDI (export sales) is increasing (decreasing) in language similarity and decreasing (increasing) in political risk.

the share of FDI-sales in bilateral sales (the intensity of FDI). In contrast to previous studies (such as Brainard, 1997, Carr et al., 2001, Helpman et al., 2004), in which bilateral FDI data for the U.S. are used, we employ OECD data on bilateral FDI. This significantly increases the country coverage, and the number of observations on bilateral FDI.[3] The data sample includes exports and FDI between OECD countries as well as exports and FDI from OECD countries to major non-OECD countries.

The paper is organised as follows. Section 2 provides a brief overview of the relevant literature on distance and international interaction. Section 3 describes the data and model setup. In Section 4 we present and discuss the regression results. Section 5 concludes.

2. Distance and international interaction

Distance affects international transactions through various channels. The most obvious dimension of distance is physical distance, which reflects transport costs. We divide other dimensions of distance between countries into tangible and intangible barriers. Trade policy barriers (tariff and non-tariff barriers) are examples of tangible barriers to trade. Examples of intangible barriers to trade include incomplete information barriers, cultural barriers and institutional barriers (Anderson and Van Wincoop, 2004).

The literature provides ample evidence for the impact of different dimensions of distance on international trade (see, e.g., Boisso and Ferrantino, 1997, Loungani et al., 2002, Guiso et al., 2004). The importance of search costs and networks in trade (see, e.g., Rauch, 1999, 2001) illustrates the importance of information costs for patterns of trade. The effect of cultural barriers consists of two aspects, cultural familiarity and cultural distance. Much like other sources of incomplete information, unfamiliarity with foreign cultures leads to search costs and adjustment costs incurred in international interactions. Familiarity with foreign culture is expected to increase if countries share a common language, and to decrease with geographical distance. Apart from that, distance in terms of cultural values and norms, causes barriers related to trust and understanding (Linders et al., 2005). Institutions influence the uncertainty surrounding transactions. The quality of institutions affects expropriation risks, the degree of corruption, the enforceability of private contracts, and hence the security of trade (see Anderson and Marcouiller, 2002). Controlling for the quality of the governance environment in both countries, bilateral trade may be hampered more if the distance between

[3] Brainard (1997), Carr et al. (2001), and Helpman et al. (2004) all use data on affiliate sales from the U.S. Bureau of Economic Analysis (BEA). The advantage of using affiliate sales is that they are a better measure of multinational activity. A drawback of using affiliate sales is that detailed data on the activities of foreign affiliates is available for the U.S., but is often sparse or unavailable for other countries.

governance systems increases. Hence, two countries that suffer from a high corruption incidence may trade more than would be expected on the basis of the quality of their respective institutional environments separately (De Groot et al., 2004).

Cultural and institutional barriers are relevant for FDI as well (see, e.g., Barkema and Vermeulen, 1997, Globerman and Shapiro, 2003). These factors determine the cost of doing international business *as such*. Recent empirical studies underline the importance of mutual trust, security of trade, and cultural diversity in explaining observed bilateral interactions between countries. The results suggest that intangible barriers matter for both exports and FDI. The effects of the cultural and institutional variables are commonly significant, even with a host of control variables (Guiso et al., 2004). Other findings point out the relevance of considering the trade-off between exports and FDI. Linders et al. (2005) find a positive (and highly significant) effect of cultural diversity on exports. This result might reflect a substitution-effect between exports and FDI: if the costs of cultural distance weigh heavier on local presence than on exports, firms substitute exports for sales by local affiliates.

3. Model and Data

3.1 The gravity model of bilateral sales

The gravity model is the most widely used spatial interaction model to study a variety of origin-destination flow phenomena, varying from commuting, telecommunication and asset flows, to migration and trade (see Fotheringham and O'Kelly, 1989). It is the workhorse model to study patterns of international trade (see Deardorff, 1998, Anderson and Van Wincoop, 2003). The gravity model postulates that bilateral trade depends on the economic size of the trade partners, which reflects market size and purchasing power, and a variety of measures of economic distance (or proximity) between the countries to reflect trade costs.[4] The gravity model has also been used to study bilateral patterns of FDI (see, for instance, Eaton and Tamura, 1994, Loungani et al., 2002, Egger and Pfaffermayr, 2004, Baltagi et al., 2007).

[4] The models used in Brainard (1997) and Helpman et al. (2004) preclude an analysis of how size matters for trade and FDI. The models include direct measures of scale economies and assume symmetry in factor endowments. According to Blonigen (2005), these are models to examine cross-industry differences rather than cross-country differences.

In this paper we use the following basic gravity equation to study patterns of bilateral foreign sales (sum of exports and sales related to FDI):

$$\ln(F_{ei}) = \beta_0 + \beta_1 \ln(GDP_e) + \beta_2 \ln(GDP_i) + \beta_3 \ln(GDPcap_e) + \beta_4 \ln(GDPcap_i) + \beta_5 \ln dist_{ei} + \varepsilon_{ei}, \quad (1)$$

where F_{ei} denotes bilateral sales. The size of the origin and destination markets is reflected by the gross domestic products of the countries of origin and destination (*GDP*), and by per capita incomes (*GDPcap*). Including GDP per capita is based on the stylized fact in international trade that "high-income countries trade disproportionately more with all trading partners and not just among themselves, while low-income countries trade less" (Deardorff, 1998, p.16).

The focus in this paper is on four dimensions of distance ($dist_{ei}$). We specify distance in terms of geography, culture and institutions, and distance caused by import tariffs. To measure cultural and institutional distance, we apply an index of distance that was developed for these purposes and first applied by Kogut and Singh (1988).[5] In addition to cultural distance, we control for a shared cultural background by including a dummy variable that indicates whether countries share a common language. Apart from a direct measure of institutional distance, we also include the quality levels of the institutional environment in the country of origin and the country of destination. Transaction costs depend on both the level of institutional quality (e.g., contract enforceability and expropriation risk) in both countries and the bilateral distance (affecting mutual understanding of and familiarity with informal solutions to governance problems). The set of control variables also includes a dummy variable that indicates whether or not countries are adjacent in space.

We are interested in the effect of the different dimensions of transactional distance on the volume of bilateral sales and on the trade-off between its components. Therefore, we distinguish two bilateral measures: the volume of bilateral sales (sum of exports and FDI-sales) and FDI intensity (share of FDI-sales in bilateral sales). To describe the volume of bilateral sales, we estimate equation (1) using ordinary least squares (OLS). For FDI intensity as dependent variable, we need to transform the gravity equation, because (by definition) FDI

[5] The index is defined as:

$$D_{i,j} = \frac{1}{K} \sum_{k=1}^{K} \left(I_{i,k} - I_{j,k}\right)^2 / V_k .$$

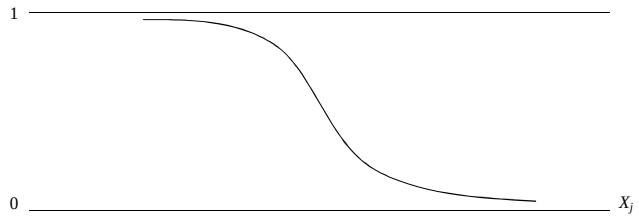
Here $D_{i,j}$ is the measure of distance between country *i* and country *j*, *K* is the number of indicators of culture/institutional quality distinguished (indexed by *k*), $I_{i,k}$ is country *i*'s score with respect to indicator *k*, and V_k the variance of indicator *k* over all countries in the sample.

intensity ranges between zero and one. We assume that FDI intensity follows a continuous logistic function between zero and one, given by:

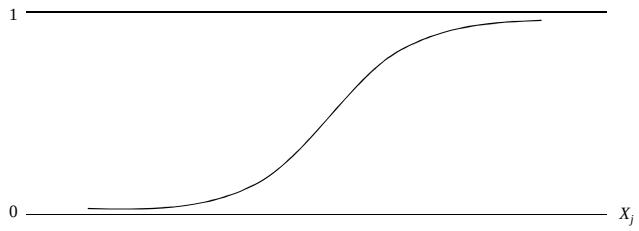
$$S_{ei} = \frac{1}{1+e^{-\sum \beta_j X_j + \varepsilon_{ei}}}, \tag{2}$$

where S_{ei} stands for the share of FDI-sales in bilateral sales, and the X_j's refer to the same set of explanatory variables as in Equation (1). Due to its functional form, the (deterministic) expected FDI intensity of bilateral sales and the random outcome are bounded between zero and one as well. For this functional form, the effect of a continuous explanatory variable on FDI intensity is illustrated graphically in Figure 1. Panel (a) in Figure 1 shows the effect of changes in variables whose coefficient (β) is negative. An increase in X reduces the FDI intensity. On the other hand, when β is positive, an increase in X increases the FDI intensity as is illustrated in panel (b) of Figure 1. We estimate equation (2) using non-linear least squares (NLS).

Figure 1. FDI intensity as a function of explanatory variables



Panel (a): $\beta < 0$



Panel (b): $\beta > 0$

3.2 The Data

Data on FDI are from the International Direct Investment Statistics database of the OECD.[6] The data represent FDI stocks. To analyse the relative importance of FDI versus exports in bilateral foreign sales, we use a proxy for sales associated with FDI.[7] The proxy is derived by transforming FDI stocks into sales using capital-output ratios.[8] Data on capital intensity are from the Penn World Tables. Export data are from the UN COMTRADE database for bilateral trade. The data sample includes exports and FDI between OECD countries as well as exports and FDI from OECD countries to major non-OECD countries, for the period 1984–1990.[9]

The source of data for GDP and GDP per capita is the Penn World Tables Mark 5.6. We use distance in miles between capital cities for geographical distance between countries. The data for the indicators of cultural distance are from Hofstede (2001).[10] Hofstede (1980, 2001) has developed a set of variables that reflect national cultures in terms of norms and values. These variables are: masculinity (versus femininity); uncertainty avoidance; individualism (versus collectivism); and power distance. Each is constructed on the basis of principal components analysis, and intends to reflect the stance of a distinct set of work-related norms and values in national cultures. Data on indicators of institutional quality are from Kaufmann et al. (2005). Kaufmann et al. (2005) have constructed six indicators of perceived institutional quality on the basis of principal components analysis. These indicators are: voice and accountability; political stability; government effectiveness; regulatory quality; rule of law; control of corruption. The institutional quality score of a country is calculated by taking the simple average of the scores across all six governance indicators. Data on adjacency and common language are from CEPII. As an indicator of tangible trade barriers,

[6] The data on FDI and GDP (see below) are those from Blonigen et al. (2003). The data were kindly provided by Bruce Blonigen.

[7] Comparison of data on affiliate sales from the BEA and our measures of FDI-related sales for the U.S. shows high levels of correlation: for 1990, these are equal to 0.99 or 0.90 in the case of inward FDI sales, and 0.85 or 0.92 for outward sales, depending on whether the capital-output ratio of the parent country or the host country is used.

[8] We have used the capital-output ratio of destination countries to transform FDI stocks into sales related to FDI, the idea being that output from FDI is determined foremost by the characteristics of the local market. Still, one may also argue that it is the technology and/or management techniques of the parent firm (origin country) that determine output. In this case one would apply the capital-output ratio of the country of origin. Both methods yield similar estimation results (available on request).

[9] The data period largely conforms to Blonigen et al. (2003), for the sake of comparison. Without changing the results qualitatively, we have omitted the years 1982-1983 and 1991-1992 from our sample due to a lack of observations. Although FDI has increased rapidly in the last two decades in particular, we may assume that the (marginal) effects of distance on trade and FDI are more or less constant over time. For instance, the effect of (geographic) distance on trade is shown to be persistent over time despite falling costs of transport and communication (see, e.g., Disdier and Head, 2008, Linders, 2006).

[10] Supplemented with additional countries (Linders et al., 2005).

we use trade-weighted applied tariffs from the WITS data set. Further information on the variables used in this paper, descriptive statistics and correlations for our data sample are presented in Appendix A.

4. Empirical Results

This section presents the results from estimating gravity equations for bilateral foreign sales and for the share of FDI-sales.

4.1. The gravity model of total bilateral sales and FDI intensity

The first specification in Table 1 presents the results for the basic model of bilateral sales, given in equation (1). The results indicate that the patterns of bilateral sales are explained fairly well by the gravity equation. The effect size for the traditional gravity model variables, GDP and geographical distance, is comparable to the standard findings in empirical studies of bilateral trade patterns (see Frankel, 1997, Disdier and Head, 2008, Linders et al., 2008). Total sales increase with both the GDP of the origin and the destination country, and fall with geographical distance. Following the stylized fact that high-income countries trade more (Deardorff, 1998), we included GDP per capita of the origin and destination countries in the gravity equation for total bilateral sales. The statement by Deardorff receives some empirical support from our estimates of the basic model. Except for per capita income of the country of origin, all variables in the base model are highly statistically significant.

The results for FDI intensity are given in column (2). First, we find clear evidence of a conventional proximity-concentration trade-off in geographical terms. FDI intensity increases with geographical distance and this effect is highly statistically significant. Regarding the other traditional gravity equation variables, we can see that the country of origin is relatively more involved in FDI-related sales if its GDP level is higher. In contrast, the GDP in the destination country does not appear to affect the composition of bilateral sales.[11] A possible explanation is that the share of highly productive firms tends to be higher in larger economies, because of scale advantages at the firm level that can be exploited on the domestic market. Because highly productive companies are more likely to engage in FDI (see, e.g., Helpman et al., 2004), FDI would respond elastically to GDP in the parent country. A similar reasoning may explain why GDP per capita in the parent country is important in

[11] These findings are consistent with the existing literature on FDI. See, for example, Bergstrand and Egger (2007, p. 296) who note that 'typical FDI gravity equation estimates find home country GDP elasticities significantly larger than host country GDP elasticities'.

explaining the trade-off between FDI and exports. If only the most productive of firms that engage in international transactions become established as multinational corporations, a high average income and productivity is likely to yield relatively more FDI-related sales.

Table 1. Estimation results

	Basic model		Culture, institutions and bilateral tariffs		Fixed effects
	Log Total sales	FDI intensity	Log Total sales	FDI intensity	Log Total sales
	(1)	(2)	(3)	(4)	(5)
Log GDP exporter	0.90***	0.14***	1.02***	0.36***	
	(37.99)	(4.72)	(40.36)	(10.35)	
Log GDP importer	0.76***	0.02	0.86***	0.02	
	(35.12)	(0.74)	(36.02)	(0.47)	
Log GDP/cap exporter	0.10	1.62***	–1.23***	–0.44	
	(0.90)	(8.56)	(7.92)	(1.64)	
Log GDP/cap importer	0.72***	0.17***	–0.03	0.08	
	(18.06)	(3.28)	(0.37)	(0.65)	
Log Distance	–0.70***	0.14***	–0.59***	0.10***	–0.68***
	(29.83)	(4.65)	(23.35)	(2.84)	(21.55)
Language dummy			0.51***	0.48***	0.46***
			(6.79)	(5.46)	(6.75)
Adjacency			0.42***	–0.51***	0.41***
			(5.24)	(4.48)	(5.92)
Cultural distance			–0.03*	–0.14***	–0.09***
			(1.79)	(4.93)	(5.19)
Inst. quality exporter			0.83***	1.53***	
			(8.90)	(8.31)	
Inst. quality importer			0.63***	0.29**	
			(7.13)	(2.13)	
Inst. distance			0.02	0.04	0.10**
			(0.53)	(0.75)	(2.39)
Log(1+Tariff)			–3.79***	2.54**	–4.80***
			(5.25)	(2.13)	(3.59)
Constant	–15.29***	–20.59***	–1.62	–5.60**	12.31***
	(14.29)	(11.62)	(1.27)	(2.70)	(26.01)
Observations	1145	1145	1145	1145	1145
Adjusted R^2	0.74	0.71	0.80	0.76	0.89

Notes: Absolute robust *t*-statistics in parentheses. Stars indicate statistical significance: * significant at 10%, ** significant at 5%, *** significant at 1%. Specifications for FDI intensity are estimated using nonlinear least squares. Specifications for total sales are estimated with standard OLS. Columns 1-4: year dummies included (not shown). Column 5 includes importer-year and exporter-year specific dummies. Data cover the period 1984–1990.

4.2. The multiple dimensions of distance

We now turn to the main question in this paper, i.e. how transaction costs that arise from different dimensions of distance affect the volume and composition of bilateral sales. Column (3) in Table 1 presents the estimation results for total bilateral sales volumes.[12] Column (4) reports the outcomes for FDI intensity. Specification (5), for total bilateral sales, includes year-specific fixed effects for country of origin and country of destination and is included to assess robustness for a number of our dimensions of distance. The fixed-effects specification is in line with theoretical concerns about omitted variables in the gravity equation for exports (see Feenstra, 2004). The disadvantage, though, is that country-specific regressors cannot be included because of the fixed effects. This implies, for example, that this specification cannot assess the effect of the level of institutional quality in both origin and destination.

As shown in column (3), the gravity equation again performs quite well in explaining total bilateral foreign sales. The sum of exports and FDI sales depends negatively on geographical distance, as before, although the magnitude of distance decay falls when we add other dimensions of proximity or distance affecting transactions. The sign of the effect of most dimensions of distance (language, adjacency, cultural distance, institutional quality and import tariffs) is as one would expect, given the impact we *a-priori* believe they have on transaction costs.

Bilateral sales decrease with cultural distance.[13] Although the effect of distance in cultural norms and values is statistically significant only at the 10% level in specification (3), the estimate is statistically more significant in the fixed-effects regression. Next, we turn to institutional quality and institutional distance. Institutional quality positively and significantly affects bilateral interaction. This reflects that better institutions reduce transaction costs. The estimated effect of institutional distance does not support our ex-ante expectations, neither in the extended model (3), nor in the fixed effects specification (5). We would expect bilateral sales to increase if institutional environments are more similar between countries. In the fixed-effects estimation, the effect of institutional distance on bilateral sales is significantly positive. This finding is contrary to estimates for bilateral trade previously found in the

[12] We have also disentangled bilateral sales, and estimated gravity equations for exports and FDI-sales. The results are presented separately in Appendix B. Because we have used data on FDI stocks to compute FDI-sales, we also present gravity equation estimates for FDI stocks there.

[13] Cultural distance is estimated to have a positive effect on exports and a negative effect on FDI (see Table B1 in Appendix B). These results suggest that cultural distance is of particular importance to FDI and that firms substitute exports for FDI when cultural distance increases. Nevertheless, in a specification with full country-specific fixed effects, the effect of cultural distance is negative for both exports and FDI alike. Thus, the results no longer provide evidence for the substitution (in absolute terms) of FDI by exports. Rather, they are consistent with a trade-off in relative terms.

literature, and may be related to the nature of the sample in our analysis. The set of origin countries only consists of 12 OECD countries, while destination countries include both OECD and non-OECD countries. Low institutional distance applies to trade between OECD countries, and high institutional distance to trade between OECD and non-OECD countries. This explains why institutional distance and destination country institutional quality are highly correlated in our sample (see Table A2). Since flows originating from countries with relatively low institutional quality are lacking from this sample, it may be difficult to capture the effect of institutional distance (as separate from institutional quality).

The results in column (3) of Table 1 seem at odds with the stylized fact on the role of GDP per capita in bilateral sales. Per capita income of the origin country has a negative and significant effect on bilateral sales. This suggests that more developed countries engage less in outward bilateral sales, all else equal. The level of development of the destination country has no significant impact on bilateral sales. Despite the stylized facts quoted by Deardorff, the theoretical literature that underpins the gravity equation does not predict any relation between the level of development and total bilateral export. In fact, GDP per capita may proxy for omitted variables such as institutional quality that are highly correlated to it. It is quite common to find an insignificant or negative effect of per capita income on bilateral trade once institutional effectiveness is controlled for (Anderson and Marcouiller, 2002, De Groot et al., 2004). A negative effect may reflect that, when countries become wealthier, the share of total expenditure devoted to traded goods falls, because the structure of production and consumption shifts from commodities towards services.[14]

With respect to FDI intensity, we see that the extension into multiple dimensions of distance supplements the conventional proximity-concentration trade off. The relative importance of FDI increases with geographical distance, as before. The results also strongly indicate a shift from exports to FDI if tariff barriers increase. This supports the conventional proximity-concentration trade off.[15]

[14] As FDI stocks include the service sector, it is not as straightforward to explain why FDI is negatively related to income per capita of the parent country, having controlled for institutional quality. A possible explanation could be found in composition effects of FDI. This would hold if, when per capita income rises, a decline in bilateral manufacturing FDI relative to GDP tends to outweigh a concomitant increase in services FDI.

[15] The results in Appendix B, where export and FDI sales are disentangled, show a relative trade-off; both FDI sales and exports negatively depend on distance and tariffs, but the elasticity is higher for trade. In fact, FDI sales only show a statistically weak decline if tariffs rise, indicating a possibly substantial substitution of exports by FDI sales in the face of high tariff barriers (see, e.g., Carr et al., 2001, Markusen, 2002). For comparison, Brainard (1997) finds a positive coefficient of trade barriers on the level of affiliate sales, even though she notes that, strictly speaking, the proximity-concentration hypothesis applies to shares rather than to levels of affiliate sales and trade. Carr et al. (2001) also predict and find a positive effect of trade costs in the host country on the level of affiliate sales.

The results furthermore indicate that the relative importance of FDI sales increases as the quality of institutions in both the parent and host country increases. The effect of institutional quality of the parent country is particularly large. This may reflect that only the most productive firms engage in FDI which are likely to be found only in high-quality institutional environments (Helpman et al., 2004).

As a robustness check, we also estimated specifications including absolute per capita GDP differentials to control for factor-proportions and preference differences (cf. Brainard, 1997). Our results suggest that countries with similar levels of income trade and invest more amongst each other. This provides support for the Linder (1961) hypothesis that similarity in income promotes bilateral sales. However, the support for this result is statistically weak. Per capita GDP similarities turn out to be relatively more important for FDI, a result that mirrors previous findings in Brainard (1997). However, the statistical significance of this finding is low. The results do not affect other findings qualitatively, and are available on request.

Robustness using only cross-sectional variation

The results presented above are obtained from a panel data set. The use of panel data generally yields more efficient estimators than cross-sectional or time series data because data vary over two dimensions, countries and time (see, e.g., Verbeek, 2002). Nevertheless, the weaker the time-series variation in bilateral trade and FDI, the closer we are to merely running a series of cross-sections.[16] Significance levels (standard errors) of the regression coefficients may then be overstated (understated) due to dependence of observations over time. In this subsection we therefore examine the specifications of total sales and FDI intensity using purely cross-sectional data. This is done by averaging the variables over time. The results are given in Table 2.

[16] Lankhuizen (2009) shows that the data are clustered by exporter and importer countries, and exporter-importer combinations.

Table 2. Results from cross-section

	Culture, institutions and bilateral tariffs	
	Log Total sales	FDI intensity
	(1)	(2)
Log GDP exporter	0.95***	0.41***
	(18.03)	(5.72)
Log GDP importer	0.87***	0.03
	(16.33)	(0.38)
Log GDP per capita exporter	–0.97***	–0.33
	(2.99)	(0.54)
Log GDP per capita importer	–0.12	0.07
	(0.66)	(0.24)
Log Distance	–0.60***	0.06
	(10.69)	(0.75)
Language dummy	0.39**	0.48**
	(2.27)	(2.47)
Adjacency	0.50***	–0.51**
	(2.78)	(2.03)
Cultural distance	–0.05	–0.15**
	(1.40)	(2.31)
Institutional quality exporter	0.79***	1.61***
	(3.71)	(3.59)
Institutional quality importer	0.77***	0.35
	(4.26)	(1.12)
Institutional distance	0.05	0.05
	(0.84)	(0.38)
Log(1+Tariff)	–3.56**	3.69
	(2.33)	(1.30)
Constant	–2.23	–7.25
	(0.83)	(1.48)
Observations	223	223
Adjusted R^2	0.81	0.75

Notes: Absolute robust *t*-statistics in parentheses. Starts indicate statistical significance: * significant at 10%, ** significant at 5%, *** significant at 1%.

The table indicates that *t*-statistics (standard errors) of all variables are generally lower (higher) in the cross-section estimation. In a few cases, coefficients are no longer statistically significant.[17] Nevertheless, the sign patterns and coefficient sizes are qualitatively robust.

Discussion

We find that different dimensions of distance affect exports and FDI differently. As a result, some destinations are served relatively heavily through exports and others more through sales from FDI. The share of FDI sales increases with geographical distance. As geographical distance increases so do transport costs. Total foreign sales (exports and sales related to FDI)

[17] In particular, this pertains to the effect of cultural distance on total sales and the effects of geographical distance, institutional quality of the importer and bilateral tariffs on FDI intensity.

fall with geographical distance, but it constitutes a bigger cost for exports than FDI. On the other hand, 'soft' barriers, i.e. language, culture and institutions, are particularly important for FDI. This can be explained from the fact that local presence entails a relatively deep involvement with and exposure to local cultures and institutions. Also, the demands in terms of language are higher for operating a plant in a foreign market compared to exporting.

To interpret the economic significance for FDI intensity of the coefficients in column (4) in Table 1, we use typical values of the explanatory variables in the sample. Table 3 gives the expected value of FDI intensity for the minimum and maximum values, the sample mean and the mean plus (minus) one standard deviation, for each of the explanatory variables fixing all other explanatory variables to their sample mean.

Table 3. Economic significance of parameter estimates: FDI intensity

	Min.	–1 St. Dev.	Mean	+1 Std. Dev.	Max.
Log GDP exporter	0.18	0.25	0.34	0.44	0.51
Log GDP importer	0.33	0.33	0.34	0.34	0.35
Log GDP per capita exporter	0.44	0.36	0.34	0.32	0.31
Log GDP per capita importer	0.30	0.33	0.34	0.35	0.35
Log Distance	0.27	0.31	0.34	0.36	0.37
Language dummy	0.32	0.30	0.34	0.38	0.43
Adjacency	0.34	0.37	0.34	0.31	0.24
Cultural distance	0.41	0.38	0.34	0.29	0.20
Institutional quality exporter	0.12	0.23	0.34	0.46	0.49
Institutional quality importer	0.24	0.30	0.34	0.38	0.38
Institutional distance	0.33	0.33	0.34	0.35	0.38
Log(1+ Tariff)	0.32	0.31	0.34	0.37	0.51

Note: the numbers indicate the value of FDI intensity for typical values of the explanatory variables in our sample, fixing all other variables to their sample mean. 'Min.' and 'Max.' denote the minimum and maximum values in the sample; '–1 (+1) Std. Dev.' denote –1 (+1) standard deviation from the sample mean.

Our results illustrate that FDI does not merely substitute for trade when transport costs and trade barriers are high: FDI sales incur costs of their own. Table 3 indicates that, for example, increasing cultural distance by one standard deviation from its sample mean *ceteris paribus* reduces the share of FDI sales in total foreign sales (FDI plus exports) by 5 percentage points. Similarly, an increase in institutional quality of the parent and the host country by one standard deviation from their sample mean increases the share of FDI sales by 12 and 4 percentage points, respectively. For comparison, the effects of our 'soft' dimensions of transactional distance on the trade-off between exports and FDI are comparable to, and sometimes more substantial, than the effects of the traditional proximity-concentration control variables. An increase in geographical distance by one standard deviation from its sample mean increases the share of FDI sales by 2 percentage points. A one standard deviation

increase in bilateral import tariffs increases the share of FDI sales by 3 percentage points. For comparison of their quantitative effects on FDI intensity, we can express changes in intangible barriers as tariff equivalents (similar to Anderson and Van Wincoop, 2004). A decrease in cultural distance of one standard deviation is equivalent to an 8 percentage point increase of the average bilateral tariff. The tariff equivalents of an increase in institutional quality of the parent and the host country of one standard deviation are 22 and 7%-points, respectively.

5. Conclusion

To serve foreign markets, firms can either export or set up a local subsidiary through horizontal FDI. According to the proximity-concentration trade-off (Brainard, 1997, Helpman et al., 2004) local sales associated with FDI increase relative to exports the higher are transport costs and trade barriers and the lower are investment barriers and scale economies at the plant level relative to the corporate level.

In this paper, we extend the framework for analysing the trade-off between exports and FDI empirically. We investigate the effect of various dimensions of distance on the composition of total bilateral interaction, *viz.* geographical distance and distance in economic terms due to tangible trade barriers such as tariffs and intangible barriers such as cultural and institutional differences between countries. Unlike the conventional proximity-concentration trade-off our approach explicitly takes into account that intangible barriers affect the fixed and variable costs related to FDI as well and may affect the trade-off between exports and FDI differentially.

We show that different dimensions of distance affect exports and FDI differently. First, there is clear evidence in support of a conventional proximity-concentration trade-off. The share of FDI sales increases with both geographical distance and import tariffs. On the other hand, this paper illustrates that FDI does not merely substitute for trade when transport costs and trade barriers are high. It incurs costs of its own. These costs are primarily of an intangible nature. The share of FDI in total bilateral sales decreases with language differences and cultural distance, and increases with institutional quality in both the parent and host country. Hence, 'soft' barriers are particularly important for FDI. Our results, though, do not offer robust support for a negative effect of institutional distance on either trade or FDI.

Finally, our results indicate that larger economies engage relatively more in outward FDI, while the size of the foreign market affects exports and FDI by and large equally. This may be interpreted to provide support for the argument that only relatively high-productivity

firms are active on the export market and the most productive firms become multinational firms by investing abroad. On the other hand, per capita income, as a measure of productivity, does not have a statistically positive effect on the FDI intensity of bilateral sales. This reflects that high-income countries tend to have less bilateral interaction both inward and outward, once we control for the effect of institutional quality.

References

Anderson, J.E. (1999): Why do Nations Trade (So Little)?, *Boston College Working Papers in Economics*, no. 428, Boston.

Anderson, J.E. and D. Marcouiller (2002): Insecurity and the Pattern of Trade: An Empirical Investigation, *Review of Economics and Statistics*, 84(2), pp. 342–352.

Anderson, J.E. and E. Van Wincoop (2003): Gravity with Gravitas: A Solution to the Border Puzzle, *American Economic Review*, 93, pp. 170–192.

Anderson, J.E. and E. Van Wincoop (2004): Trade Costs, *Journal of Economic Literature*, 42, pp. 691–751.

Baltagi, B.H., P. Egger and M. Pfaffermayr (2007): Estimating Models of Complex FDI: Are There Third-Country Effects?' *Journal of Econometrics*, 140, pp. 260–281.

Barkema, H.G. and F. Vermeulen (1997): What Differences in the Cultural Backgrounds of Partners are Detrimental for International Joint Ventures?, *Journal of International Business Studies*, 28, pp. 845–864.

Bergstrand, J.H. and P. Egger (2007): A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises, *Journal of International Economics*, 73, pp. 278–308.

Blonigen, B.A. (2005): A Review of the Empirical Literature on FDI Determinants, *NBER Working Paper*, no. 11299, Cambridge, MA.

Blonigen, B.A., R.B. Davies and K. Head (2003): Estimating the Knowledge-Capital Model of the Multinational Enterprise: Comment, *American Economic Review*, 93(3), pp. 980–994.

Boisso, D. and M. Ferrantino (1997): Economic Distance, Cultural Distance, and Openness in International Trade: Empirical Puzzles, *Journal of Economic Integration*, 12, pp. 456–484.

Brainard, S.L. (1997): An Empirical Assessment of the Proximity-Concentration Trade-Off between Multinational Sales and Trade, *American Economic Review*, 87, pp. 520–544.

Carr, D.L., J.R. Markusen and K.E. Maskus (2001): Estimating the Knowledge-Capital Model of the Multinational Enterprise, *American Economic Review*, 91(3), pp. 693–708.

Deardorff, A.V. (1998): Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?, in: J. Frankel (ed.), *The Regionalization of the World Economy*. Chicago: University of Chicago Press.

Disdier, A.C. and K. Head (2008): The Puzzling Persistence of the Distance Effect on Bilateral Trade, *Review of Economics and Statistics*, 90, pp. 37–41.

Eaton, J. and A. Tamura (1994): Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns, *Journal of the Japanese and International Economies*, 8, pp. 478–510.

Egger, P. and M. Pfaffermayr (2004): Foreign Direct Investment and European Integration in the 1990s, *World Economy*, pp. 99–110.

Feenstra, R.C. (2004): *Advanced International Trade: Theory and Evidence*, Princeton and Oxford: Princeton University Press.

Fotheringham, A.S. and M.E. O'Kelley (1989): *Spatial Interaction Models: Formulations and Applications*, Dordrecht: Kluwer Academic Publishers.

Frankel, J.A. (1997): *Regional Trading Blocs in the World Economic System*, Washington, D.C.: Institute for International Economics.

Globerman, S. and D. Shapiro (2003): Governance Infrastructure and US Foreign Direct Investment, *Journal of International Business Studies*, 34, pp. 19–39.

Groot, H.L.F. de, G.J.M. Linders, P. Rietveld and U. Subramanian (2004): The Institutional Determinants of Bilateral Trade Patterns, *Kyklos*, 57, pp. 103–123.

Grossman, G.M. (1998): Comment on: Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?' in: Frankel J.A. (ed.), *The Regionalization of the World Economy*. Chicago and London: University of Chicago Press.

Guiso, L., P. Sapienza and L. Zingales (2004): Cultural Biases in Economic Exchange, *NBER Working Paper*, no.11005, Cambridge, MA.

Helpman, E., M.J. Melitz and S.R. Yeaple (2004): Export versus FDI with Heterogeneous Firms, *American Economic Review*, 94(1), pp. 300–316.

Hofstede, G. (1980): *Culture's Consequences. International differences in work-related values*. Beverly Hills, CA: Sage.

Hofstede, G. (2001): *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*, Thousand Oaks, London, New Delhi: Sage Publications.

Kaufmann, D., A. Kraay and M. Mastruzzi (2005): *Governance Matters IV: Governance Indicators for 1996-2004*, Washington: World Bank, May 2005.

Kogut, B. and H. Singh (1988): The Effect of National Culture on the Choice of Entry Mode, *Journal of International Business Studies*, 19, pp. 411–432.

Loungani, P., A. Mody and A. Razin (2002): The Global Disconnect: The Role of Transactional Distance and Scale Economies in Gravity Equations, *Scottish Journal of Political Economy*, 49, pp. 526–543.

Linder, S.B. (1961): *An Essay on Trade and Transformation*, New York: John Wiley and Sons.

Lankhuizen, M.B.M. (2009): *Determinants of Foreign Direct Investment: An Empirical Investigation into Sources of Attraction*, PhD thesis, forthcoming.

Linders, G.J.M., M.J. Burger and F.G. van Oort (2008): A Rather Empty World: The Many Faces of Distance and the Persistent Resistance to International Trade, *Cambridge Journal of Regions, Economy and Society*, pp. 1–19.

Linders, G.J.M., A.H.J. Slangen, H.L.F. de Groot and S. Beugelsdijk (2005): Cultural and Institutional Determinants of Bilateral Trade Flows, *Tinbergen Institute Discussion Paper*, no. 2005-074/3, Amsterdam-Rotterdam.

Markusen, J.R. (2002): *Multinational Firms and the Theory of International Trade*, Cambridge, MA: MIT Press.

Obstfeld, M. and K. Rogoff (2000): The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?' in: *NBER Macroeconomics Annual*, no. 15, Cambridge, MA: The MIT Press.

Rauch, J.E. (1999): Networks versus Markets in International Trade, *Journal of International Economics*, 48, pp. 7–35.

Rauch, J.E. (2001): Business and Social Networks in International Trade, *Journal of Economic Literature*, 39, pp. 1177–1203.

Appendix A

This appendix provides details of data definitions and sources used in this paper.

Variable	**Indicators**
T_{ij}	Exports from country *i* to *j*. Source: UN COMTRADE database for bilateral trade. Panel 1982-1992.
FDI_{ij}	OECD outward FDI stock in millions of real U.S. dollars. Panel 1982-1992. Source: International Direct Investment Statistics database of the OECD.
FDI sales	(Value of FDI stock) * *GDP/K*.
GDP	Real GDP constructed from Penn World Tables 5.6.
K	Capital stock constructed from Penn World Tables 5.6.
Cultural distance	Kogut-Singh index of four dimensions of national culture identified by Hofstede (1980, 2001).
Institutional quality	Average of six governance indicators from Kaufmann (2005).
Institut'l distance	Kogut-Singh index of six governance indicators from Kaufmann (2005). Data are for 1996.
Adjacency	Dummy indicating adjacency. Source: CEPII.
Language dummy	Dummy indicating whether two countries share a common official language. Source: CEPII.
Distance	Distance between capital cities (in miles). Source: CEPII.
Tariffs	Trade-weighted applied tariffs. Tariffs are for 1999. Source: WITS.

Table A1 presents the set of origin and destination countries in the estimation sample.

Table A1. Countries in sample

Origin (OECD)	Destination countries (OECD and non-OECD)		
Australia	Argentina	Ireland	Switzerland
Austria	Australia	Italy	Turkey
Canada	Austria	Japan	UK
France	Belgium/Luxembourg	Korea	USA
Italy	Canada	Mexico	Venezuela
Japan	Chile	The Netherlands	
Korea	Colombia	Norway	
The Netherlands	Denmark	New Zealand	
Norway	Finland	Philippines	
Sweden	France	Portugal	
UK	Greece	Spain	
USA	India	Sweden	

Descriptive statistics for the estimation sample are given in Table A2.

Table A2. Descriptive statistics

	Mean	Std. Dev.	Min	Max	Obs.
Log Exports	14.12	1.61	5.74	18.39	1145
Log FDI stock	6.25	2.40	–1.18	11.92	1145
Log FDI sales	6.17	2.41	–1.26	11.98	1145
Log total foreign sales	7.75	1.63	2.59	12.44	1145
FDI intensity	0.34	0.25	0.00	1.00	1145
Log GDP exporter	13.31	1.19	11.03	15.32	1145
Log GDP importer	12.25	1.25	10.13	15.32	1145
Log GDP per capita exporter	9.50	0.22	8.53	9.80	1145
Log GDP per capita importer	9.12	0.63	6.92	9.80	1145
Log absolute diff. GDP per capita	0.51	0.57	0.00	2.78	1145
Log Distance	8.25	1.14	5.16	9.88	1145
Language dummy	0.18	0.38	0.00	1.00	1145
Adjacency	0.07	0.26	0.00	1.00	1145
Cultural distance	2.20	1.47	0.02	7.44	1145
Institutional quality exporter	1.47	0.35	0.59	1.90	1145
Institutional quality importer	1.25	0.65	–0.46	1.93	1145
Institutional distance	0.74	1.04	0.02	5.43	1145
Log (1 + tariff)	0.03	0.05	0.00	0.31	1145

Table A3 gives the correlation matrix for the data used in the estimation samples.

Table A3. Correlation matrix (*N*=1145)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. Log Exports	1																	
2. Log FDI stock	0.69	1																
3. Log FDI sales	0.68	0.99	1															
4. Log tot foreign sales	0.93	0.86	0.86	1														
5. FDI intensity	0.02	0.67	0.69	0.35	1													
6. Log GDP exporter	0.28	0.41	0.42	0.36	0.31	1												
7. Log GDP importer	0.51	0.31	0.33	0.50	0.02	–0.10	1											
8. Log GDP cap exp	0.06	0.33	0.33	0.15	0.36	0.36	–0.08	1										
9. Log GDP cap imp	0.38	0.32	0.25	0.37	0.02	–0.20	0.19	0.01	1									
10. Log abs diff. GDPcap	–0.29	–0.23	–0.17	–0.27	0.03	0.25	–0.06	0.06	–0.91	1								
11. Log Distance	–0.32	–0.11	–0.08	–0.23	0.22	0.36	0.14	0.12	–0.21	0.31	1							
12. Language dummy	0.10	0.28	0.28	0.19	0.33	0.06	0.03	0.22	–0.02	0.09	0.07	1						
13.Adjacency	0.34	0.20	0.19	0.30	–0.09	–0.04	0.03	0.02	0.13	–0.15	–0.43	0.24	1					
14. Cultural distance	–0.12	–0.26	–0.25	–0.18	–0.23	–0.03	–0.08	–0.08	–0.20	0.22	0.00	–0.41	–0.23	1				
15. Inst. quality exp	–0.05	0.21	0.20	0.03	0.28	–0.22	–0.01	0.58	0.07	–0.06	–0.17	0.20	0.00	0.07	1			
16. Instit quality imp	0.23	0.24	0.19	0.23	0.07	–0.15	–0.12	0.01	0.81	–0.75	–0.22	0.09	0.06	–0.17	0.06	1		
17. Instit distance	–0.19	–0.19	–0.15	–0.19	–0.06	0.12	0.07	–0.01	–0.61	0.66	0.16	–0.02	–0.05	0.28	–0.05	–0.78	1	
18. Log (1 + tariff)	–0.28	–0.19	–0.14	–0.23	0.07	0.20	0.14	–0.05	–0.70	0.70	0.45	0.05	–0.16	0.03	–0.17	–0.64	0.54	1

Appendix B

Table B1. Background regressions: Exports, FDI stocks and Sales associated with FDI

	Culture, institutions and bilateral tariffs			Adding per capita GDP differences			Fixed effects		
	Exports	FDI stocks	FDI sales	Exports	FDI stocks	FDI sales	Exports	FDI stocks	FDI sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log GDP exporter	0.88***	1.48***	1.48***	0.88***	1.49***	1.49***			
	(35.06)	(31.12)	(29.68)	(34.78)	(31.25)	(29.91)			
Log GDP importer	0.87***	0.80***	0.89***	0.88***	0.82***	0.92***			
	(37.06)	(18.91)	(19.83)	(38.75)	(18.66)	(19.70)			
Log GDP cap exporter	–0.94***	–1.44***	–1.43***	–0.93***	–1.39***	–1.37***			
	(5.48)	(4.49)	(4.27)	(5.53)	(4.23)	(3.97)			
Log GDP cap importer	–0.13	0.30*	–0.12	–0.24**	–0.09	–0.60**			
	(1.53)	(1.77)	(0.68)	(2.46)	(0.32)	(2.18)			
Log Distance	–0.65***	–0.58***	–0.58***	–0.65***	–0.56***	–0.56***	–0.73***	–0.72***	–0.72***
	(27.82)	(11.15)	(10.71)	(26.68)	(10.48)	(9.99)	(20.67)	(11.84)	(11.84)
Language dummy	0.30***	0.78***	0.75***	0.31***	0.81***	0.79***	0.23***	0.60***	0.60***
	(4.56)	(6.34)	(5.94)	(4.65)	(6.50)	(6.16)	(4.06)	(4.82)	(4.82)
Adjacency	0.63***	0.12	0.08	0.63***	0.12	0.09	0.57***	0.22	0.22
	(8.01)	(0.72)	(0.50)	(7.99)	(0.75)	(0.54)	(8.77)	(1.52)	(1.52)
Cultural distance	0.03	–0.24***	–0.25***	0.03*	–0.24***	–0.25***	–0.09***	–0.20***	–0.20***
	(1.58)	(5.47)	(5.47)	(1.68)	(5.34)	(5.32)	(4.54)	(4.78)	(4.78)
Inst. quality exp.	0.21*	2.55***	2.55***	0.21*	2.54***	2.54***			
	(1.96)	(11.68)	(11.34)	(1.95)	(11.63)	(11.31)			
Inst. quality imp.	0.56***	0.84***	1.00***	0.58***	0.94***	1.13***			
	(7.87)	(5.12)	(5.79)	(8.31)	(5.41)	(6.19)			
Inst. distance	0.00	0.13*	0.12*	0.02	0.18**	0.19**	0.16***	0.05	0.05
	(0.03)	(1.88)	(1.65)	(0.42)	(2.42)	(2.37)	(2.84)	(0.61)	(0.61)
Log (1+Tariff)	–5.75***	–2.25	–2.06	–5.79***	–2.37	–2.22	–7.27***	2.75	2.75
	(6.49)	(1.43)	(1.24)	(6.57)	(1.50)	(1.33)	(4.94)	(1.10)	(1.10)
Abs diff. Log GDPcap				–0.12	–0.42*	–0.53**			
				(1.10)	(1.85)	(2.20)			
Constant	6.22***	–11.92***	–9.51***	6.90***	–9.49***	–6.46**	19.40***	10.67***	10.64***
	(5.00)	(4.35)	(3.33)	(4.47)	(3.45)	(2.26)	(38.34)	(13.33)	(13.30)
Observations	1145	1145	1145	1145	1145	1145	1145	1145	1145
Adjusted R^2	0.79	0.65	0.62	0.79	0.65	0.62	0.87	0.83	0.83

Notes: Absolute robust *t*-statistics in parentheses. Stars indicate statistical significance: * significant at 10%, ** significant at 5%, *** significant at 1%. Specifications for FDI intensity are estimated using nonlinear least squares. Specifications for total sales are estimated with standard OLS. Columns 1-4: year dummies included (not shown). Column 5 includes importer-year and exporter-year specific dummies. Data cover the period 1984–1990.